

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant:	Bertrand et al.	)	Examiner: Chawla, J.
		)	
Serial No.:	10/521,579	)	Group Art Unit: 1781
		)	
Filed:	May 4, 2005	)	Confirmation Number 4029
		)	
Title:	Gelatin Substitute Product and	)	Attorney Docket: BC-01-US
	Uses in Food Preparation	)	

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**PRE-APPEAL BRIEF REQUEST FOR REVIEW**

Mail Stop AF  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir/Madam:

In response to the Final Office Action dated August 18, 2010, Applicants respectfully request for a Pre-Appeal Brief Review of this case for reversal of the Examiner's rejections of the claims. In support of the request, Applicants hereby submit the following and respectfully request for consideration:

**Notice of Appeal** — attached hereto;  
**PTO/SB/33** — attached hereto;  
**REMARKS** — pages 2-5;  
**Exhibit A** — Listing of Claims – attached hereto;  
**Exhibit B** – EP 0564787 and – attached hereto

## **REMARKS**

Claims 1, 4, 8, 10 and 13 are pending and rejected. Claims 2, 3, 5, 7, 9, 11 and 12 are canceled.

A. Claims 1, 4, and 10 are rejected under 35 USC 103(a) as being unpatentable over Duffett (WO 98/13133) in view of Itagaki et al. (EP 0564787).

Regarding claim 1, the Examiner finds Duffett teaches a powdered form of cocoa butter (page 12, lines 31 to page 13, line 20). Although Duffett is silent as to the cocoa butter being deodorized, the Examiner finds Itagaki teaches of confectionery fat compositions including deodorized cocoa butter (page 3, lines 10 – 31). Thus, according to the Examiner, one of ordinary skill in the art would have been motivated to modify Duffett at least for the purpose of removing the undesirable cocoa butter flavor and making the fat based powdered product more versatile and usable in foods with other flavors, such as vanilla and fruit favors as taught by Itagaki.

Applicants do not believe the Examiner has established a prima facie case of obviousness, and requests the rejection be reversed, as the rejection is based merely on identification in the prior art of characteristics of the claimed composition. Mere identification in the prior art of each component of a composition does not show that the combination as a whole lacks the necessary attributes for patentability, i.e., is obvious. *In re Kahn*, 441 F.3d 977, 986 (Fed. Cir. 2006). To establish a prima facie case of obviousness based on a combination of elements in the prior art, the law requires a motivation to select the references and to combine them in the particular claimed manner to reach the claimed invention. *Eli Lilly and Co. v. Zenith Goldine Pharma., Inc.*, 471 F.3d 1369 (Fed. Cir. 2006). The proper inquiry is whether based on the teachings of Duffett and Itagaki et al., would one of skill in the art be motivated to produce a composition which consists essentially of at least 99 weight % cocoa butter, deodorized to an extent of 90-95%, and is in the form of a powder. Applicants believe no, as neither references teach or suggest all of the limitations of the claims. Moreover, one of skill in the art would not seek to combine the teachings of Duffett and Itagaki to practice the claimed invention, as the inventions cannot be combined.

Taking Duffett as the primary reference, Duffett discloses cocoa butter or cocoa mass is obtained in liquid form, atomized, and the atomized liquid is rapidly cooled to form a powder. Duffett does not specifically disclose the cocoa butter is at least 99% weight cocoa butter, or

specify the use of compositions which are at least 99% weight cocoa butter. Duffett discloses the powdered cocoa butter is used during the chocolate making process as part of the crumb making process or at the conching/tempering stage of chocolate production (pages 12 – 13) and provides no other use for powdered cocoa butter. One of ordinary skill in the art, relying on the disclosure of Itagaki et al. would not seek to deodorize the powdered cocoa butter of Duffett because it simply does not make sense to eliminate the i.e., chocolate odor when producing chocolate.

The Examiner finds Duffett provides additional uses for the powdered cocoa butter at page 13, lines 10 – 12, that is, the product can be used in a variety of products such as in cereals, ice-cream, chocolate drinks, chilled products or the like. However, these uses are based on an embodiment of Duffett which is different than relied upon by the Examiner for the disclosure of powdered cocoa butter. The thirteenth aspect of Duffett provides the composition is “cocoa or chocolate based liquid” and does not disclose the use of cocoa butter, much less a composition consisting essentially of at least 99% by weight cocoa butter.

Moreover, it is submitted the Examiner’s belief that one of skill in the art would remove the undesirable cocoa butter flavor to make the fat based powdered product more versatile and usable in foods with other flavors, such as vanilla and fruit favors as taught by Itagaki is misplaced because the composition of the present invention is clearly deodorized. If one of skill in the art were to impart additional flavors to the cocoa butter, such a composition may not produce cocoa butter being deodorized to an extent of 90 – 95%.

If Itagaki is taken as the primary reference, Itagaki discloses cocoa butter may be deodorized. However, Itagaki does not teach to what degree the cocoa butter is deodorized, and does not disclose cocoa butter is specifically deodorized to an extent of 90-95%. Itagaki merely discloses cocoa butter may be deodorized without specifying the degree.

Itagaki continues to disclose confectionary fat compositions comprising from 20 to 80% by weight of a deodorized cocoa butter and from 20 to 80% by weight of hardened fats. Such compositions are suitable for sandwiching or filling in biscuits, cakes and bread, which is excellent in flavor, melting properties, texture, shape retention at ordinary temperature and whipping properties, has a sharp meltability in the mouth. Itagaki emphasizes the unsuitability of cocoa butter alone for these purposes, and thus, one of skill in the art would not be motivated

to produce a cocoa butter composition consisting of at least 99% by weight cocoa butter, as such compositions are clearly unsuitable for the uses contemplated by Itagaki.

The Examiner finds one of ordinary skill would be motivated to modify Duffett at least for the purpose of removing the undesirable cocoa butter flavor and making the fat based powdered product more versatile and usable in foods with other flavors as taught by Itagaki. However, as previously discussed, Duffett only discloses the use of powder cocoa butter during the chocolate making process as part of the crumb making process or at the conching/tempering stage of chocolate production (pages 12 – 13) and provides no other use for the powdered cocoa butter. Additionally, one of skill in the art would not seek to use Duffett's powder cocoa butter in Itagaki because, again, Itagaki seeks to eliminate the formation of fat crystals. Itagaki gets around this problem by incorporating 20 to 80% by weight of hardened fats with deodorized cocoa butter. Thus, even if the powdered cocoa butter was used in the composition of Itagaki, such a composition would not consist of at least 99 weight % cocoa butter, but would necessarily include 20 to 80% weight hardened fat.

Itagaki discloses cocoa butter needs to be tempered, but fat compositions which are tempered can be hardly whipped because of the fat crystal content. Page 2, lines 11 – 19. The Examiner believes the Applicant is arguing Itagaki fails to show certain features of the invention. However, Applicants are bringing this section to the Examiner's attention in order to illustrate why one of skill in the art would not seek to combine the teachings of Duffett and Itagaki. Itagaki produces fat compositions without tempering to avoid the formation of crystals, i.e., by adding a hardened fat to cocoa butter. Duffett discloses producing fat crystals. Page 1, lines 14 – 17. One of skill in the art would not seek to combine the teachings of Duffett and Itagaki because Itagaki seeks to avoid forming fat crystals, while the objective of Duffett is to produce fat crystals. Thus, the teachings of Duffett and Itagaki cannot be combined. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Assoc. Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir 1983). "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984).

Claims 4 and 10 all depend from claim 1. As neither Duffett or Itagaki et al. teach or suggest all of the limitations of claim 1, it is submitted the rejection of claims 4 and 10 are improper, and Applicants request the rejection be reversed.

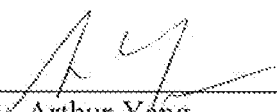
B. Claims 8 and 13 are rejected under 35 USC 103(a) as being unpatentable over Duffett (WO 98/13133) in view of Itagaki et al. (EP 0564787), and further in view of Kawabata et al. (US 5,460,847)

Applicants respectfully request the rejection be reversed, as claims 8 and 13 depend from claim 1. As previously discussed, Duffett and Itagaki et al. fail to teach or suggest all of the limitations of claim 1, and Kawabata fails to cure such defects. Applicants request the rejection be reversed.

Respectfully submitted,

Date: 20 Dec 2010

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# EXHIBIT A

**Listing of Claims:**

1. (Previously Presented)      A non-gelling gelatin substitution product, consisting essentially of at least 99 weight % cocoa butter, deodorized to an extent of 90-95%, and is in the form of a powder.
2. – 3. (Canceled)
4. (Previously Presented)      The substitution product according to claim 1, comprising an antioxidant.
5. – 7. (Canceled)
8. (Previously Presented)      A method for incorporating a substitution product according to claim 1 into a culinary preparation, wherein said product is incorporated directly into the preparation when the latter is heated to a temperature greater than 60° C.
9. (Canceled)
10. (Previously Presented)      A method of incorporating a substitution product according to claim 1 into a culinary preparation, wherein the culinary preparation has a moisture content of 40 to 50%.
11. – 12. (Canceled).
13. (Previously Presented)      The method of claim 8, wherein the resulting culinary preparation comprising the substitution product is subsequently cooled to room temperature.

## EXHIBIT B



(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

**EP 0 564 787 B1**

(12)

**EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention  
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12.05.1999 Bulletin 1999/19

(51) Int. Cl.<sup>6</sup>: **A23G 3/00, A23G 1/00**

(21) Application number: **93102265.1**

(22) Date of filing: **12.02.1993**

(54) **Confectionary fat composition and method for producing the same**

Zusammensetzung für Süßwarenfett und Herstellungsverfahren

Composition de graisse de confiserie et méthode de fabrication

(84) Designated Contracting States:  
**BE CH DE ES FR GB LI LU NL**

(30) Priority: **20.02.1992 JP 33466/92**

(43) Date of publication of application:  
**13.10.1993 Bulletin 1993/41**

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(56) References cited:

<b>DE-A- 2 717 602</b>	<b>DE-A- 2 745 718</b>
<b>DE-A- 2 901 093</b>	<b>DE-A- 4 122 500</b>
<b>NL-A- 7 801 145</b>	<b>US-A- 4 601 790</b>

- DATABASE WPI Week 7130, Derwent Publications Ltd., London, GB; Class D13, AN 71-50353S & JP-B-46 026 823 (ASAHI ELECTRIC CHEMICAL) 04 August 1971
- DATABASE WPI Week 7130, Derwent Publications Ltd., London, GB; Class D13, AN 71-50354S & JP-B-46 026 824 (ASAHI ELECTRO CHEMICAL) 04 August 1971
- DATABASE WPI Week 8109, Derwent Publications Ltd., London, GB; Class D13, AN 81-14609D & JP-A-55 164 296 (ASAHI DENKA KOGYO KK) 20 December 1980
- PATENT ABSTRACTS OF JAPAN vol. 14, no. 057 (C-684) 02 February 1990 & JP-A-01 285 153 (ASAHI DENKA KOGYO KK) 16 November 1989

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

**EP 0 564 787 B1**

## Description

[0001] This invention relates to a confectionary fat composition containing cocoa butter and suitable for sandwiching or filling in biscuits, cakes and bread, which is excellent in flavor, melting properties, texture, shape retention at ordinary temperature and whipping properties, has a sharp meltability in the mouth and can be used without effecting any tempering treatment, and a method for producing the same.

[0002] Cocoa butter, which is hard at ordinary temperature but melts around the bodily temperature, has been used as a fat to be blended mainly in chocolates. However, the triglyceride structure of the cocoa butter makes it necessary to temper this material before the use.

[0003] Fat compositions which should be tempered can be hardly whipped and thus good whipping properties can be scarcely obtained in these cases. After the completion of the tempering treatment, namely, the crystal content in a fat rapidly increases and thus whipping on an appropriate crystal content level can be hardly effected. When a fat once solidified is temperature-controlled, the narrow temperature range allowing an appropriate crystal content makes it difficult to achieve uniform whipping properties.

[0004] It is, therefore, difficult to use cocoa butter, which should be tempered, as a confectionary fat suitable for sandwiching or filling purposes.

[0005] In addition, the application range of cocoa butter is restricted since its characteristic and distinct flavor might throw the flavor of the total products out of balance.

[0006] Although Japanese Patent Laid-Open No. 58037/1985 describes a method for producing an air-containing chocolate by rapidly cooling and kneading a chocolate, only a small amount of cocoa butter, if any, is used in this method.

[0007] On the other hand, there have been employed vegetable oils and animal fats and hardened products thereof, either alone or as a combination of a number of them, as confectionary fats for sandwiching and filling in, for example, biscuits, cakes and bread.

[0008] However these fats suffer from some problems in the melting properties at eating due to the triglyceride compositions thereof. More specifically, when high-melting fats are blended in order to maintain a good shape retention at ordinary temperature, the obtained product shows poor melting properties and a waxy texture at eating. As a result, the flavor of the product is seriously deteriorated and the commercial value thereof is lowered. When no high-melting fat is used in order to improve the melting properties, on the other hand, the obtained product has a poor shape retention at ordinary temperature. In this case, when the temperature is not appropriately controlled during the distribution, the shape and properties of the product are sometimes deteriorated.

[0009] DE-B-2717602 describes a hardened vegetable fat obtained by selective hydrogenation of vegetable oils or fats. Said hardened fat is used in an amount of 30% by weight for the preparation of chocolate.

## SUMMARY OF THE INVENTION

[0010] Accordingly, it is an object of the present invention to provide a confectionary fat composition containing cocoa butter and suitable for sandwiching or filling in biscuits, cakes and bread, which is excellent in flavor, melting properties, texture, shape retention at ordinary temperature and whipping properties, has a sharp meltability in the mouth and can be used without effecting any tempering treatment, and a method for producing the same.

[0011] The present inventors have successfully found out that a confectionary fat composition, whereby the above-mentioned object of the present invention can be achieved, can be obtained by combining a cocoa butter of an improved color tone and flavor with hardened fat(s) to thereby make the best use of the excellent melting properties of the cocoa butter which has been mainly applied to chocolates only.

[0012] The present invention, which has been completed based on the above-mentioned finding, provides a confectionary fat composition comprising from 20 to 80 % by weight of deodorized cocoa butter and from 20 to 80 % by weight of hardened fat(s) of a melting point of 45°C or lower and a solid fat content at 20°C from 10 to 50 % and at 30°C from 1 to 20 %.

[0013] Further, the present invention provides a method for producing the above-mentioned confectionary fat composition according to the present invention which comprises melt-mixing from 20 to 80 % by weight of deodorised cocoa butter with from 20 to 80 % by weight of hardened fat(s) of a melting point of 45°C or lower and a solid fat content at 20°C from 10 to 50 % and at 30°C from 1 to 20 %, and then rapidly cooling and kneading the resulting mixture.

[0014] The confectionary fat composition of the present invention can be suitably used for sandwiching and filling in biscuits, cakes and bread, since it is excellent in flavor, melting properties, texture, shape retention at ordinary temperature and whipping properties, has a sharp meltability in the mouth and can be used without effecting any tempering treatment.

[0015] According to the method of the present invention, further, the above-mentioned confectionary fat composition of the present invention can be obtained.

## DETAILED DESCRIPTION OF THE INVENTION

[0016] Now the confectionary fat composition of the present invention will be described in detail.

[0017] When the confectionary fat composition of the present invention is to be used as, for example, a filling cream of a vanilla or fruity flavor, the characteristic color of cocoa butter is unnecessary. Even if it is to be used as a cream of chocolate flavor, the distinct flavor of cocoa butter is undesirable. In the present invention, therefore, deodorised cocoa butter obtained by deodorizing cocoa butter is employed.

[0018] Although the properties and flavor of cocoa butter somewhat vary depending on the production area and type, the production area and type of the cocoa butter are not particularly restricted in the present invention. Further, a mixture of cocoa butter of various types may be used.

[0019] The cocoa butter is deodorized by a method commonly used for refining fats, namely, the steam distillation method. The conditions for this treatment are, for example, as follows; at a temperature of from 160 to 200°C, preferably from 170 to 190°C, at a degree of vacuum lower than a usual level, namely 7 mmHg or lower, preferably 5 mmHg or lower, for a period of time of 30 minutes or longer, preferably from 1 hour or longer.

[0020] When the deodorizing temperature is lower than 160°C, any sufficient deodorizing effect cannot be obtained. When the deodorizing temperature exceeds 200°C, on the other hand, the flavor of the obtained confectionary fat composition is deteriorated.

[0021] In the present invention, it is preferable to use a cocoa butter which has been deodorized, as described above, and further bleached by the method as will be described hereinafter as the deodorised cocoa butter.

[0022] The bleaching can be effected by a method commonly used for refining fats. In usual, cocoa butter is bleached by heating under the atmospheric or reduced pressure in the presence of activated clay. For example, it may be effected by using from 1 to 5 % of activated clay at a temperature of 80 to 120°C.

[0023] As the deodorized cocoa butter to be used in the present invention, deodorized cocoa butter optionally blended with untreated cocoa butter (undeodorized cocoa butter) may be used, so long as the blend is colorless or pale yellow and has a mild flavor of cocoa butter or scarcely has any flavor or odor.

[0024] As the hardened fats to be used in the present invention, those which are obtained by hydrogenating commonly used vegetable oils such as palm oil, soybean oil, rapeseed oil, rice bran oil, cottonseed oil, corn oil, coconut oil or safflower oil and animal fats such as beef tallow, lard, milk fat or fish oil in such a manner as to give a melting point of 45°C or lower, preferably 40°C or lower, may be employed.

[0025] The use of hardened fat(s) of a melting point of 45°C or lower makes it possible to give a product having appropriate properties, texture and crystal content. However, it is not preferable to use hardened fat(s) of a melting point exceeding 45°C, since the product thus obtained has poor melting properties and thus its texture is deteriorated.

[0026] A blend of two or more hardened fats and a blend of hardened fat(s) together with other fats may be used, so long as the melting point of the fat blend as a whole is 45°C or lower.

[0027] Examples of the other fats include unhardened animal fats and vegetable oils and random transesterified fats.

[0028] The confectionary fat composition of the present invention contains from 20 to 80 % by weight, preferably from 40 to 70 % by weight, of the above-mentioned deodorised cocoa butter and from 20 to 80 % by weight, preferably from 30 to 60 % by weight, of the above-mentioned hardened fat(s) having a melting point of 45°C or lower.

[0029] When the content of the deodorized cocoa butter is more than 80 % by weight and that of the hardened fat(s) of a melting point of 45°C or lower is less than 20 % by weight, the temperature range capable of giving a solid fat content (hereinafter referred to simply as SFC) suitable for the whipping treatment is narrow and thus it is difficult to control the temperature. As a result, the whipping treatment becomes difficult and a low specific gravity cannot be obtained. Thus any stable whipping properties can be scarcely achieved.

[0030] When the content of the deodorized cocoa butter is less than 20 % by weight and that of the hardened fat(s) of a melting point of 45°C or lower is more than 80 % by weight, it is difficult to simultaneously achieve a good shape retention and a good meltability in the mouth affected by the cocoa butter.

[0031] The SFC of the confectionary fat composition of the present invention ranges from 10 to 50 %, preferably from 15 to 45 %, at 20°C and from 1 to 20 %, preferably from 3 to 10 %, at 30°C.

[0032] When the SFC of the fat composition at 20°C exceeds 50 %, the low plasticity deteriorates the handling characteristics such as whipping properties and a low specific gravity can be hardly obtained. When the SFC of the fat composition at 30°C exceeds 20 %, the poor whipping and melting properties make it difficult to obtain a sharp meltability in the mouth.

[0033] For the purposes of sandwiching and filling, the confectionary fat composition of the present invention is sometimes used in the form of an air-containing product. In such a case, the SFC of the confectionary fat composition in the fat temperature in the bubbling step preferably ranges from 10 to 40 %, still preferably from 15 to 30 %, in order to bubble a sufficient amount of air thereinto.

[0034] When the SFC is smaller than 10 %, the amount of fat crystals is insufficient and thus air bubbles cannot be maintained in the fat, which makes it difficult to contain the air. When the SFC exceeds 40 %, on the other hand, the

excessively large amount of fat crystals lowers the viscosity of the fat, which also makes it difficult to contain the air.

[0035] Thus, in the confectionary fat composition of the present invention, it is desirable to control the composition ratio of the deodorized cocoa butter to the hardened fat(s) and the content of other fat(s) so as to allow the SFC to fall within the range as specified above.

[0036] Further, it is preferable that the confectionary fat composition of the present invention contains 5 % by weight or less, preferably from 0.3 to 3 % by weight, of emulsifier(s) as a crystal stabilizer.

[0037] Examples of emulsifiers usable herein include glycerol fatty acid esters, sucrose fatty acid esters, sorbitan fatty acid esters, propylene glycol fatty acid esters and lecithin. In particular, it is preferable to use a combination of glycerol fatty acid ester(s) with lecithin, since a confectionary fat composition having improved whipping properties and crystal stability, lightweightness and soft touch can be obtained thereby.

[0038] Furthermore, the confectionary fat composition of the present invention may contain seasoning components, if necessary. Examples of these seasoning components include various crystalline sugars such as sucrose, liquid sugars such as starch syrup and cater-containing sugar alcohols, dairy products such as whole milk powder and condensed milk, processed egg products such as powdery yolk, processed cocoa butter products such as cocoa powder, sarcocarp jams, concentrated fruit juices, dry fruit powders, dry fruit juice powders, cheeses and nut products such as peanut paste. Furthermore, the confectionary fat composition may optionally contain liquors and perfumes.

[0039] Next, the method for producing the confectionary fat composition of the present invention will be described.

[0040] The deodorized cocoa butter and the hardened fat(s) having a melting point of 45°C or lower, each as described above, are melt-mixed and then immediately cooled and kneaded rapidly to thereby give the confectionary fat composition of the present invention.

[0041] The rapid cooling and kneading may be effected, for example, by melt-mixing the fats under heating and then rapidly cooling and kneading the fat mixture by using a scraping tube cooler such as a votator, a combinator or a perfector, by cooling the fat mixture with a cooling drum and then kneading it on, for example, a complector, or by rapidly cooling and kneading the mixture in a mixer provided with a stirrer and a cooling device.

[0042] In the rapid cooling and kneading step, an inert gas such as nitrogen gas may be bubbled into the fat composition and dispersed therein.

[0043] Further, after the completion of the abovementioned rapid cooling and kneading treatment, the mixture may be subjected to a temperature control treatment at a given temperature (in general, lower than the melting point of the fat mixture by 5 to 10°C) for a given period of time (in general, 24 to 48 hours) to thereby effect the so-called aging treatment.

[0044] The rapid cooling and kneading treatment is effected in order to stabilize crystals. When this treatment is omitted, crystals become coarse and thus no good nor smooth texture can be obtained. In this case, so-called graining frequently occurs and the whipping properties of the composition are adversely affected.

[0045] To further illustrate the present invention in greater detail, the following Examples will be given.

[Examples 1 to 6 and Comparative Examples 1 to 4]

[0046] The fat components and emulsifiers as listed in the following Tables 1 and 2 were melt-mixed together and then rapidly cooled and kneaded on a combinator. The obtained mixtures were aged at a temperature of 25 to 28°C for 24 hours. Thus each fat composition was obtained. The SFC data of the fat compositions thus obtained at 20°C and 30°C are given in the following Tables 1 and 2. As the deodorised cocoa butter, a material obtained by deodorising cocoa butter by steam-distillation at 180°C and 1 mmHg for 1 hour was used.

[0047] By using these fat compositions, blends of the composition as specified in the following Table 3 were prepared. Each product thus obtained was whipped at a material temperature of 20 to 25°C with the use of a vertical mixer to thereby give a filling cream. The specific gravity of the filling cream thus obtained was measured and its whipping properties were evaluated. Further, the flavor, meltability in the mouth and shape retention of the obtained filling cream and the occurrence of graining were examined. Regarding shape retention, a filling cream which did not bulge out even when sandwiched between biscuits, allowed to stand at 25°C for 24 hours and then lightly pressed with fingers was evaluated as good. Regarding graining, the occurrence of graining was observed after allowing each product to stand at 20°C for 3 weeks. The following Tables 1 and 2 show the results of the evaluation.

[0048] As the results given in Table 1 show, filling creams containing the confectionary fat compositions of Examples 1 to 6 according to the present invention were each excellent in flavor, meltability in the mouth, shape retention and whipping properties.

[0049] In contrast, as the results given in Table 2 show, the filling cream containing the fat composition of Comparative Example 1, which comprised undeodorized cocoa butter, was undesirable due to its distinct flavor of cocoa butter. The filling cream containing the fat composition of Comparative Example 2 contained a small amount of deodorized cocoa butter and was poor in shape retention and whipping properties. The filling cream containing the fat composition of Comparative Example 3 contained a large amount of deodorized cocoa butter and was poor in whipping properties.

Further, the filling cream containing the fat composition of Comparative Example 4, wherein hardened fats of an excessively high melting point were used, was poor in meltability in the mouth and whipping properties.

[0050] The evaluation on whipping properties, flavor, meltability in the mouth and shape retention given in the following Tables 1 and 2 was made based on the following evaluation criteria.

(1) Whipping properties:

[0051]

○ : specific gravity is 0.8 or below  
x: specific gravity exceeds 0.8.

(2) Flavor:

[0052]

○ : good, x: poor.

(3) Meltability in the mouth:

[0053]

○ : good, Δ: somewhat poor, x: poor.

(4) Shape retention:

[0054]

○ : good, Δ: somewhat poor, x: poor.

Table 1

		Example					
		1	2	3	4	5	6
Composition (part)	deodorized cocoa butter	30	50	70	30	50	50
	undeodorized cocoa butter						
	hardened rapeseed oil (m.p. 25°C)	70	50	30			
	hardened soybean oil (m.p. 35°C)				70	50	20
	hardened rapeseed oil (m.p. 60°C)						
	soybean oil						30
	glycerol monooleate	1	1	1	1	1	1
	lecithin	0.5	0.5	0.5	0.5	0.5	0.5
SFC at	20°C	12	19	41	45	31	25
	30°C	2	2	5	16	4	4
Evaluation	whipping properties	○	○	○	○	○	○
	flavor	○	○	○	○	○	○
	meltability in mouth	○	○	○	○	○	○
	shape retention	○	○	○	○	○	○
	occurrence of graining	no	do.	do.	do.	do.	do.

Table 2

		Comp. Example			
		1	2	3	4
Composition (part)	deodorized cocoa butter		10	90	50
	undeodorized cocoa butter	50			
	hardened rapeseed oil (m.p. 25°C)	50	90	10	
	hardened soybean oil (m.p. 35°C)				
	hardened rapeseed oil (m.p. 60°C)				50
	soybean oil				
	glycerol monooleate	1	1	1	1
	lecithin	0.5	0.5	0.5	0.5
SFC at	20°C	19	8	60	74
	30°C	2	1	8	56
Evaluation	whipping properties	○	X	X	X
	flavor	X	○	○	○
	meltability in mouth	○	○	○	X
	shape retention	○	X	○	○
	occurrence of graining	no	do.	do.	do.

Table 3

fat composition	65 parts
sucrose (passing 300-mesh)	35 parts
vanilla flavor	0.1 part

## Claims

1. A confectionary fat composition comprising from 20 to 80 % by weight of deodorized cocoa butter,  
from 20 to 80 % by weight of hardened fat(s) having a melting point of 45°C or lower and  
a solid fat content at 20°C from 10 to 50% and at 30°C from 1 to 20%.
2. A confectionary fat composition as claimed in claim 1, wherein said deodorized cocoa butter is a bleached one.
3. A confectionary fat composition as claimed in claim 1, wherein said hardened fat(s) have a melting point of 40°C or lower.
4. A method for producing a confectionary fat composition which comprises melt-mixing from 20 to 80 % by weight of deodorized cocoa butter with from 20 to 80% by weight of hardened fat(s) having a melting point of 45°C or lower and a solid fat content at 20°C from 10 to 50 % and at 30°C from 1 to 20 %, and then rapidly cooling and kneading the obtained mixture.

**Patentansprüche**

1. Konfektfettzusammensetzung, umfassend von 25 bis 80 Gew.-% deodorisierte Kakaobutter und von 20 bis 80 Gew.-% gehärtetes Fett oder gehärtete Fette mit einem Schmelzpunkt von 45°C oder weniger, mit einem Festfettgehalt bei 20°C von 10 bis 50% und bei 30°C von 1 bis 20%.  
5
2. Die Zusammensetzung nach Anspruch 1, worin besagte deodorisierte Kakaobutter eine gebleichte ist.
3. Die Zusammensetzung nach Anspruch 1, worin besagtes gehärtetes Fett oder besagte gehärtete Fette einen Schmelzpunkt von 40°C oder weniger aufweisen.  
10
4. Verfahren zur Herstellung einer Konfektfettzusammensetzung, umfassend Schmelzmischen von 20 bis 80 Gew.-% deodorisierter Kakaobutter mit von 20 bis 80 Gew.-% gehärtetem Fett oder gehärteten Fetten mit einem Schmelzpunkt von 45°C oder weniger, mit einem Festfettgehalt bei 20°C von 10 bis 50% und bei 30°C von 1 bis 20% und anschließendes schnelles Kühlen und Kneten der erhaltenen Mischung.  
15

**Revendications**

1. Composition de graisse de confiserie comprenant de 20 à 80% en poids de beurre de cacao désodorisé,  
20  
de 20 à 80% en poids de graisse(s) durcie(s) ayant un point de fusion de 45°C ou moins, et  
une teneur en graisse solide à 20°C de 10 à 50% et à 30°C de 1 à 20%.
2. Composition de graisse de confiserie tel que revendiquée dans la revendication 1, dans laquelle ledit beurre de cacao désodorisé est un beurre blanchi.  
25
3. Composition de graisse de confiserie tel que revendiquée dans la revendication 1, dans laquelle ladite (lesdites) graisse(s) durcie(s) ont un point de fusion de 40°C ou moins.
- 30 4. Procédé de production d'une composition de graisse de confiserie qui comprend un mélange à l'état fondu de 20 à 80% en poids de beurre de cacao désodorisé avec 20 à 80% en poids de graisse(s) durcie(s) ayant un point de fusion de 45°C ou moins et une teneur en graisse solide à 20°C de 10 à 50% et à 30°C de 1 à 20%, et ensuite un refroidissement rapide et un pétrissage du mélange obtenu.



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<b>(21) International Application Number:</b> PCT/GB97/02655  <b>(22) International Filing Date:</b> 26 September 1997 (26.09.97)  <b>(30) Priority Data:</b> 9620294.0                      28 September 1996 (28.09.96)    GB 9625413.1                      6 December 1996 (06.12.96)    GB 9702886.4                      12 February 1997 (12.02.97)    GB  <b>(71) Applicant (for all designated States except US):</b> AGGLOMERATION TECHNOLOGY LIMITED [GB/GB]; Unit 7, Monkswell Park, Manse Lane, Knaresborough, North Yorkshire HG5 8NQ (GB).  <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> DUFFETT, William [GB/GB]; 9 Calderdale Close, Knaresborough, North Yorkshire HG5 0DY (GB).  <b>(74) Agents:</b> SHERRARD-SMITH, Hugh et al.; Appleyard Lees, 15 Clare Road, Halifax, West Yorkshire HX1 2HY (GB).	<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>	
<b>(54) Title:</b> SPRAY CRYSTALLISED PRODUCTS AND PROCESSES		
<b>(57) Abstract</b>		
<p>A method of producing a granulated product having a soft texture comprises obtaining a substance in liquid form, the substance being solid at a given temperature, atomising the liquid substance, rapidly cooling the atomised liquid so that at least partially solid particles are formed and maintaining or returning the substance at or to substantially said given temperature so that said particles agglomerate to form a soft textured product.</p>		



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SPRAY CRYSTALLISED PRODUCTS AND PROCESSES

The present invention relates to spray crystallised products and the processes for producing such products and, in particular, to new granulated fat and other products and methods.

Cryogenic crystallisation of fats is known from EP 0393963 which describes apparatus and method for producing solid particles of fat for blending with dry ingredients such as animal feed. The method, called spray crystallisation, involves using a high pressure pump to transfer liquid fat to a jet and using compressed air to atomise the stream into a fine mist. The atomised mist passes through a laser cut ring which sprays liquid nitrogen or carbon dioxide onto the mist so that the fat particles rapidly cool to produce crystals of fat. The resultant fat crystals are mixed, for example with whey powder or flour, to give dry, lump-free powder.

Having carried out a considerable amount of research using the above technique, a range of new products and related processes have been developed. The products and processes have considerable potential and wide application particularly in the food industry but also in a diversity of other industries.

According to a first aspect of the invention there is provided a method of producing a granulated product having a soft texture comprising obtaining a substance in liquid form, the substance being solid at a given temperature, atomising the liquid substance, rapidly cooling the atomised liquid so that at least partially solid particles are formed and maintaining or returning the substance at or to substantially said given temperature so that said

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particles agglomerate to form a soft textured product.  
The method may include obtaining the substance in solid  
form and raising the temperature of the substance above  
said given temperature so that the substance melts to form  
5 a liquid.

According to a second aspect of the invention there  
is provided a soft textured product comprising an  
agglomeration of at least partially solid particles.  
10 Preferably said particles are produced by spray  
crystallisation.

According to a third aspect of the invention there is  
provided a method of converting a substance which is solid  
15 at a given temperature to a substance which is soft  
textured at said given temperature comprising obtaining  
said substance in liquid form, atomising said liquid,  
rapidly cooling the atomised liquid to form at least  
partially solid particles and agglomerating said particles  
20 to form a coherent mass.

The method may include obtaining the substance in  
solid form and melting said substance to form a liquid.  
Preferably the particles are agglomerated by maintaining  
25 or returning the particles at or to substantially said  
given temperature.

The invention further provides an agglomerated  
product having a soft texture produced using a method of  
30 the invention.

The substance may comprise a fat, oil and/or wax or  
a fat, oil and/or wax based composition. The substance  
may comprise a mixture of fats, oils and/or waxes or a  
35 mixture of fat, oil and/or wax and other components. The

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length of time for which said substance or particles are maintained at or returned to substantially said given temperature to cause agglomeration may depend on the substance used and the temperature.

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Said given temperature may be substantially ambient or room temperature. Preferably the atomising and rapid cooling is by means of spray crystallisation. Preferably the liquid substance is transferred to a jet by means of  
10 a high pressure pump. Preferably compressed air is used to atomise the stream of liquid into a mist. Preferably the atomised mist passes through a cryogenic cooling ring, where cryogenic liquid is introduced to rapidly cool the atomised mist. Preferably cryogenic liquid is sprayed  
15 onto the atomised mist. Preferably the cryogenic liquid comprises oxygen, nitrogen, air or carbon dioxide. Preferably the rapid cooling and agglomeration results in an alteration to the crystal structure of the substance. Thus, the process of the invention alters the substance  
20 from a solid to a soft textured product.

The agglomerated product produced has several advantages due to its soft texture. For example, the product can be used in mixes without requiring further  
25 melting, it can be readily formed into shapes or packed, or can be used in, for example, bakery mixes to reduce the amount of fat used due to the more uniform smaller crystals that occur during the spray crystallisation or atomising and rapid cooling process. Thus, the product  
30 has a soft texture which allows it to be easily mixed, cut spread, moulded or otherwise handled at a given temperature whereas the unprocessed substance at a corresponding temperature is solid and consequently does not have these properties.

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According to a fourth aspect of the invention there is provided a method of producing a frozen or chilled powder product comprising obtaining a substance in liquid form, atomising the liquid substance, rapidly cooling the atomised liquid so that at least partially solid powder particles are formed and maintaining said powder at a temperature below room temperature. The method may include obtaining the substance in solid form and melting the substance to form a liquid.

10

Preferably said powder is stored under substantially 5°C to give a chilled powder product or under substantially -18°C to give a frozen powder product, although it will be appreciated that the storing temperature may be chosen according to the required degree of cooling and the composition of the substance.

15

The substance may comprise fat and/or oil such as butter, fractionated butters or cream.

20

The frozen or chilled powder product produced has several advantages. Due to the soft nature of the powder produced, the product can be used straight from storage at chilled or deep freeze temperatures. For example, butter or butter mixes can be produced using this method which will spread straight from either the refrigerator or the freezer. It is believed that this technical effect is due to one or both of the following effects: the modification of the crystal structure during the process; the formation of powder particles with crystallised shells and super-cooled liquid centres.

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According to a fifth aspect of the invention there is provided a frozen or chilled powder product comprising a plurality of powder particles having crystallised shells

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and super-cooled liquid centres. The powder particles may comprise fat and/or oil such as butter, fractioned butters or cream.

- 5           The invention further provides a frozen or chilled powder product using the method of the invention.

10           The frozen or chilled powder product can be mixed with powder in various mixes, for example in baking applications, and will have the advantages of behaving as a liquid in the mix and will improve the efficiency of the fat or other substance in the baking or other process due to the change in crystal structure which occurs as the super-cooled liquid centre crystallises when the temperature rises, for example during baking.

20           The substance may comprise a substance which is solid at room temperature, typically a fat or oil based substance, and the method may include raising the temperature to melt the substance to form a liquid. Alternatively, the substance may comprise a substance which is liquid at room temperature. For example, the substance may comprise a liquid egg based substance such as yolk, albumen, whole egg and/or mixtures thereof. The substance may comprise liquid butter and/or cream or other dairy substances or products and/or mixtures thereof. Thus, these substances can be processed into a frozen or chilled powder which is stored at frozen or chilled temperatures.

30

Such base substances are normally damaged during the normal freezing process and the process of the invention minimises this damage. For example, normal freezing of a liquid substance can cause the base substance to separate

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out and the water content to freeze separately. The spray crystallisation technique of the invention inhibits this.

Furthermore, the rate at which these products can be  
5 thawed is greatly increased when converted into a powder,  
so much so that the frozen powder can be introduced into  
a blender or mixer and mixes easily as it thaws. Thawing  
of a frozen powder product of the invention typically  
takes a few minutes in contrast to several hours for a  
10 normally frozen product of this kind to thaw into a usable  
product.

Other suitable substances include liquid mixes such  
as ice cream mixes which can be processed by means of the  
15 method of the invention into a stable frozen powder. Such  
products can be consumed directly from the refrigerator or  
freezer and are sufficiently soft to consume immediately  
due to the combined effects of the crystal size and the  
supercooled liquid fractions. Alternatively the products  
20 can be thawed to liquid in very short times either at  
ambient conditions or using microwaves. Some products  
have been shown to thaw to a liquid in a matter of  
seconds.

25 The substance may comprise water so that using the  
method of the invention a frozen powder product can be  
produced which is a mixture of fine water crystals and  
supercooled liquid water. This product can be formed into  
various shapes or used for example to prepare an ice rink  
30 and the product freezes normally when the temperature  
rises in a controlled way.

Thus it can be seen that the frozen or chilled powder  
product produced can be shaped or handled more easily than

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a corresponding normally frozen product and can be caused to freeze normally by raising the temperature.

5       The substance may comprise a sugar solution which is then processed into a frozen or chilled powder. Such a product can be used to modify or improve the rate at which certain solutions crystallise.

10       Cream in the form of a frozen or chilled powder produced according to the fourth aspect of the invention or according to the fifth aspect of the invention can be further processed as follows:-

15       (i) The frozen powder may be mixed, for example using a high speed whisk, to change from frozen cream to butter and whey. The whey may be removed by passing both products over a mesh screen and the remaining solid material is butter. This process allows the raw material,  
20       i.e. cream, to be stored for extended periods, which is not possible with normally chilled cream, and still be capable of processing into butter. The additional benefit of this method is the fact that butter can be produced from a  
25       simple whisking operation without the use of a butter churn.

30       (ii) The frozen powder may be thawed under refrigeration i.e. at about 4 to 8°C and may then be whipped to give a comparable performance to cream that has been only chilled. Previously, frozen cream, i.e. cream frozen by known methods, would not whip without the addition of stabilisers.

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According to a sixth aspect of the invention there is provided a method of producing a powder product comprising mixing a first substance which is fat, oil and/or wax based with a second substance which is not fat, oil and/or wax based to form a liquid mixture, atomising the liquid mixture and rapidly cooling the atomised mixture so that at least partially solid powder particles are formed.

The first and/or second substance may be melted or otherwise processed to form a liquid substance before, after or during the mixing. Preferably the substances are premixed at the melting stage.

Preferably the first substance comprises fat, oil and/or wax. The second substance may comprise a liquid and/or a powder and may be fat, oil and/or wax soluble. The second substance may comprise a colour, flavour and/or vitamin substance. For example, the second substance may comprise liquid flavour resins and/or emulsions, liquid colour resins and/or emulsions, liquid vitamins or vitamin emulsions, typically oil soluble vitamins. The method of the invention produces a stable powder with enhanced carrier protection against flavour and/or colour losses caused by moisture, oxygen and light. Also the release of the active constituents, for example of the second substance, can be controlled by the fat mixture used.

In the case of the second substance comprising a powder, the method provides a stable powder product in which the powder substance is encapsulated by the first substance. Levels as high as 75% powder encapsulation have been achieved. The method allows the encapsulation of a variety of powders. The second substance may comprise a chemical in powder form. The method provides encapsulation of such chemicals either singly or in

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multiples and the release of these chemicals from the stable powder product produced can be controlled by the temperature required to melt the first substance. Thus, chemicals that would normally react with each other can be prevented from so reacting by processing according to the invention and due to the absence of water.

The second substance may comprise a colour and/or flavour in powder form which can be encapsulated either singly or in multiples. The release of the colour and/or flavour from the stable powder product produced can be controlled by the temperature required to melt the first substance. Furthermore, the colours and/or flavours will have an added protection from degradation caused by moisture, oxygen and light.

The second substance may comprise an unstable powder such as vitamins which can be encapsulated either singly or in multiples using the method of the invention. The release of the unstable powders involved can then be controlled by the temperature required to melt the first substance and again the powders will have an added protection from degradation caused by moisture, oxygen and light.

The second substance may comprise one or more starches, flour and/or hydrocolloids typically in powder form with or without the addition of a suitable lecithin. The method provides encapsulation of such powders to provide a product with one or more of the following properties: the first substance coating allows these products to be mixed with hot or boiling liquids without subsequent lumping and poor mixing that normally occurs; the coating slows down the ability of the hot or boiling liquid to reach all of the thickening agent at once and

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this prevents lumps or particles of semi-dissolved or dispersed product being formed. Additionally, the emulsion formed by mixing with hot liquid has enhanced viscosity caused by hydrogen bonding between the constituents which assists the stability of viscosity when the product is vigorously mixed. Thus, the method of the invention may include subsequent mixing with a hot or boiling liquid.

10       The second substance may comprise an emulsifier and/or a preservative. In this case, the product produced by the method of the invention may be used for example in the leather industry. Typically the product will be a stable powder at room temperature and will be more  
15 convenient to use, stable and will improve the oil/fat/wax and preservative penetration into, for example, leather or the like.

20       The second substance may comprise one or more spices or spice products, either in original form, milled or not milled, or blended with other ingredients such as salt. The encapsulation of the spice prevents attack from light, heat and oxygen and greatly reduces flavour loss. Furthermore, by using a high oil or first substance  
25 temperature, typically in the region of 50 to 250°C, before or after the powders are added or the first and second substances are mixed, it is possible to reduce microbiological loading of the powder or second substance, for example of the spices or spice mixes, to an acceptable  
30 food grade level.

35       The second substance may comprise one or more dried/freeze dried microbiological organisms, e.g. bacteria, yeasts, moulds or the like which can be encapsulated either singly or in multiples using the

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method of the invention. The rapid cooling would minimise further damage to these micro-organisms and the subsequently produced powders will have an added protection from degradation caused by moisture, oxygen and  
5 light. The release of these micro-organisms is controlled by the temperature required to melt the fat or by an interaction with a suitable enzyme.

Thus the invention includes a method of encapsulating  
10 a powder substance comprising the steps of mixing the powder substance with a fat, oil and/or wax based substance to form a liquid mixture, atomising the liquid mixture and rapidly cooling the atomised mixture. The substances and method may be substantially as described  
15 above.

According to a seventh aspect of the invention there is provided a method of producing a powder product adapted to be applied to a material such as leather comprising  
20 obtaining a liquid fat, oil and/or wax, atomising the liquid and rapidly cooling the atomised liquid so that a powder product is formed which is stable at room temperature. The product gives improved penetration when applied to leather or the like.

25 The method may include mixing an emulsifier and/or a preservative with the liquid before atomisation. The method may include obtaining a fat, oil and/or wax in solid or other form and melting or otherwise processing it  
30 to form a liquid.

The invention further provides a powder product formed using a method of the invention.

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According to an eighth aspect of the invention there is provided a method of treating a material such as leather or wooden and/or plastic surfaces comprising applying a powder product of the invention to a surface of the material, for example by rubbing. The powder may or may not be electrostatically charged.

According to a ninth aspect of the invention there is provided a method of encapsulating powder particles comprising mixing powder particles with a liquid substance to form a liquid mixture, atomising the liquid mixture and rapidly cooling the atomised mixture. Preferably the liquid substance comprises fat, oil and/or wax.

According to a tenth aspect of the invention there is provided a method of producing a vitamin product comprising mixing a vitamin based substance, either in liquid or powder form, with a liquid substance to form a liquid mixture, atomising the liquid mixture and rapidly cooling the atomised mixture. Preferably the liquid substance comprises fat, oil and/or wax.

According to an eleventh aspect of the invention there is provided a method of producing a coloured and/or flavoured product comprising mixing a coloured and/or flavoured substance, either in liquid or powder form, with a liquid substance to form a liquid mixture, atomising the liquid mixture and rapidly cooling the atomised mixture. Preferably the liquid substance comprises fat, oil and/or wax.

According to a twelfth aspect of the invention there is provided a method of making chocolate comprising obtaining cocoa butter or cocoa mass in liquid form, atomising the liquid, rapidly cooling the atomised liquid

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to form a powder and adding the powder during the chocolate making process as part of the crumb making process or at the conching/tempering stage of chocolate production. This method assists in controlling and/or  
5 reducing the chocolate processing time due to the modification of the crystal structure of the cocoa butter or cocoa butter element. The invention includes chocolate made according to the above method.

10 According to a thirteenth aspect of the invention there is provided a method of producing a stable free flowing cocoa or chocolate based product comprising obtaining a cocoa or chocolate based liquid, atomising the liquid and rapidly cooling the atomised liquid to form a  
15 stable free flowing powder. The cocoa or chocolate based liquid may comprise fat and/or oil and/or mixtures such as cocoa butter, cocoa mass and various chocolate products. The product produced can be used as an ingredient in a variety of products such as in cereals, ice-cream,  
20 chocolate drinks, chilled products or the like.

According to a fourteenth aspect of the invention there is provided a method of taking spray crystallised frozen powder, which may contain for example 5-95% water  
25 content, and introducing such powder directly to a freeze drier.

The advantages would be as follows:-

30 i) The freezing of the original product would be accomplished in one rapid operation thus considerably reducing the damage caused by the normal freezing process.

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5           ii)           The product would already be in a frozen powder form which is the ideal form for freeze drying. Normally products are frozen into blocks and then broken down into irregular particles for freeze drying to commence.

10           (iii)          On occasions where the spray crystallised powder is in the form of a mixture of crystalline powders and super cooled water - this may facilitate the removal of this water more rapidly than usual and with reduced product damage during the freeze drying process.

15           The invention includes products made according to any of the above described methods of the invention.

20           The invention further provides apparatus for receiving a substance which is substantially solid at a given temperature, said apparatus comprising means for rapidly cooling said substance to produce a product which is substantially or relatively soft textured at said given temperature.

25           Preferably said apparatus comprises means for atomising a liquid substance. The apparatus may comprise means for liquifying said solid substance.

30           Preferably said substance is fat, oil and/or wax based, and preferably said soft textured product is spreadable. The substance may comprise any substance referred to herein.

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The invention further provides a product which has been at least partially solidified by spray crystallisation.

5            Preferably such product is oleaginous.

10           The steps of atomising and rapidly cooling in any of the methods described are preferably performed by conventional spray crystallisation techniques. A typical apparatus and method for performing spray crystallisation is described in EP 0393963 and the contents of that document are incorporated herein by reference. In particular, the atomisation may be by spraying and by means of an atomising nozzle through which liquid under pressure is pumped. The rate of spraying and size of the spray ejection apertures on the nozzle may be controlled or selected as desired to suit the particular requirements, for example depending on the nature of the liquid or mixture to be sprayed. The rapid cooling may be by means of directing one or more jets of cryogenic liquid, such as liquid nitrogen, oxygen, air or carbon dioxide, onto or towards the atomised spray. The size and arrangement of such jets may be controlled or selected as desired to suit the particular requirements and may be as described in EP 0393963. The methods may be controlled or automated to achieve the desired results.

30           It will be appreciated that the present invention is not intended to be restricted to the above embodiments which are described by way of example only. In particular, any features described and/or any of the steps of any method or process described may be combined in any combination and any features and/or steps described with reference to or defined by any aspect of the invention may be combined with any features and/or steps of any other

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aspect of the invention. Thus, for example, the invention includes a method according to the first or fourth aspect of the invention comprising the further step of pre-mixing as described with reference to the sixth or ninth aspect  
5 of the invention.

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and  
10 which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification  
15 (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

20 Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly  
25 stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the  
30 foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any  
35 method or process so disclosed.

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CLAIMS

1. A method of producing a granulated product having a soft texture comprising obtaining a substance in liquid form, the substance being solid at a given temperature, atomising the liquid substance, rapidly cooling the atomised liquid so that at least partially solid particles are formed and maintaining or returning the substance at or to substantially said given temperature so that said particles agglomerate to form a soft textured product.
2. A soft textured product comprising an agglomeration of at least partially solid particles, said particles having been produced by spray crystallisation.
3. A method according to any preceding claim, wherein said particles are produced by spray crystallisation.
4. A method of converting a substance which is solid at a given temperature to a substance which is soft textured at said given temperature comprising obtaining said substance in liquid form, atomising said liquid, rapidly cooling the atomised liquid to form at least partially solid particles and agglomerating said particles to form a coherent mass.
5. A method according to any preceding claim, wherein the method includes obtaining the substance in solid form and melting said substance to form a liquid.
6. A method according to any preceding claim, wherein the particles are agglomerated by maintaining or returning the particles at or to substantially said given temperature.

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7. An agglomerated product having a soft texture produced using a method according to any preceding claim.
8. A method according to any preceding claim, wherein  
5 the substance comprises a fat, oil and/or wax or a fat, oil and/or wax based composition.
9. A method according to any preceding claim, wherein  
10 the substance comprises a mixture of fats, oils and/or waxes or a mixture of fat, oil and/or wax and other components.
10. A method according to any preceding claim, wherein  
15 the atomising and rapid cooling is by means of spray crystallisation.
11. A method according to any preceding claim, wherein  
the liquid substance is transferred to a jet by means of a high pressure pump.  
20
12. A method according to any preceding claim, wherein compressed air is used to atomise the stream of liquid into a mist.
- 25 13. A method according to claim 12, wherein the atomised mist passes through a cryogenic cooling ring, where cryogenic liquid is introduced to rapidly cool the atomised mist.
- 30 14. A method according to claim 13, wherein the cryogenic liquid is sprayed onto the atomised mist.
15. A method according to claim 13 or 14, wherein the  
35 cryogenic liquid comprises oxygen, nitrogen, air or carbon dioxide.

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16. A method according to any preceding claim, wherein the rapid cooling and agglomeration results in an alteration to the crystal structure of the substance.

5 17. A method of producing a frozen or chilled powder product comprising obtaining a substance in liquid form, atomising the liquid substance, rapidly cooling the atomised liquid so that at least partially solid powder particles are formed and maintaining said powder at a  
10 temperature below room temperature.

18. A method according to claim 17, wherein the method includes obtaining the substance in solid form and melting the substance to form a liquid.

15 19. A method according to claim 17 or 18, wherein said powder is stored under substantially 5°C to give a chilled powder product or under substantially -18°C to give a frozen powder product.

20 20. A method according to claim 17, 18 or 19, wherein the substance comprises fat and/or oil.

21. A frozen or chilled powder product comprising a  
25 plurality of powder particles having crystallised shells and super-cooled liquid centres.

22. A frozen or chilled powder product produced using a method according to any of claims 17 to 20.

30 23. A method according to any of claims 17 to 20, wherein the substance comprises a substance which is solid at room temperature and the method includes raising the temperature to melt the substance to form a liquid.

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24. A method according to any of claims 17 to 20, wherein the substance comprises a substance which is liquid at room temperature.
- 5 25. A method according to any of claims 17 to 20, 23 or 24, wherein the substance comprises a liquid egg based substance.
- 10 26. A method according to any preceding claim wherein the substance comprises liquid butter and/or cream or other dairy substances or products and/or mixtures thereof.
- 15 27. A method according to any of claims 17 to 20, 23 or 24, wherein the substance comprises water so that using the method of the invention a frozen powder product is produced which is a mixture of fine water crystals and supercooled liquid water.
- 20 28. A method according to any of claims 17 to 20, 23 or 24, wherein the substance comprises a sugar solution.
- 25 29. A method of producing a powder product comprising mixing a first substance which is fat, oil and/or wax based with a second substance which is not fat, oil and/or wax based to form a liquid mixture, atomising the liquid mixture and rapidly cooling the atomised mixture so that at least partially solid powder particles are formed.
- 30 30. A method according to claim 29, wherein the first and/or second substance is melted or otherwise processed to form a liquid substance before, after or during the mixing.
- 35 31. A method according to claim 29 or 30, wherein the substances are premixed at the melting stage.

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32. A method according to any of claims 29 to 31, wherein the first substance comprises fat, oil and/or wax.
33. A method according to any of claims 29 to 32, wherein  
5 the second substance comprises a liquid and/or a powder and is fat, oil and/or wax soluble.
34. A method according to any of claims 29 to 33, wherein  
10 the second substance comprises a colour, flavour and/or vitamin substance.
35. A method according to claim 34, wherein the second substance comprises liquid flavour resins and/or emulsions, liquid colour resins and/or emulsions, and/or  
15 liquid vitamins or vitamin emulsions.
36. A method according to any of claims 29 to 35, wherein the second substance comprises a powder and the powder product produced comprises the powder substance  
20 encapsulated by the first substance.
37. A method according to claim 36, wherein the second substance comprises a colour and/or flavour in powder form which is encapsulated either singly or in multiples.  
25
38. A method according to claim 36, wherein the second substance comprises an unstable powder such as vitamins which is encapsulated either singly or in multiples.
- 30 39. A method according to any of claims 29 to 36, wherein the second substance comprises one or more starches, flour and/or hydrocolloids.

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40. A method according to any of claims 29 to 36, wherein the second substance comprises an emulsifier and/or a preservative.
- 5 41. A method according to any of claims 29 to 36, wherein the second substance comprises one or more spices or spice products.
- 10 42. A method according to any of claims 29 to 36, wherein the second substance comprises one or more dried/freeze dried microbiological organisms.
- 15 43. A method of encapsulating a powder substance comprising the steps of mixing a powder substance comprising the steps of mixing the powder substance with a fat, oil and/or wax based substance to form a liquid mixture, atomising the liquid mixture and rapidly cooling the atomised mixture.
- 20 44. A method of producing a powder product adapted to be applied to a material comprising obtaining a liquid fat, oil and/or wax, atomising the liquid and rapidly cooling the atomised liquid so that a powder product is formed which is stable at room temperature.
- 25 45. A method according to claim 44, wherein the method includes mixing an emulsifier and/or a preservative with the liquid before atomisation.
- 30 46. A method according to claim 44 or 45, wherein the method includes obtaining a fat, oil and/or wax in solid or other form and melting or otherwise processing it to form a liquid.

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47. A method of treating a material comprising applying a powder product produced by a method according to any of claims 44 to 46 to a surface of the material.

5 48. A method of encapsulating powder particles comprising mixing powder particles with a liquid substance to form a liquid mixture, atomising the liquid mixture and rapidly cooling the atomised mixture.

10 49. A method according to claim 48, wherein the liquid substance comprises fat, oil and/or wax.

50. A method of producing a vitamin product comprising mixing a vitamin based substance, either in liquid or  
15 powder form, with a liquid substance to form a liquid mixture, atomising the liquid mixture and rapidly cooling the atomised mixture.

51. A method according to claim 50, wherein the liquid  
20 substance comprises fat, oil and/or wax.

52. A method of producing a coloured and/or flavoured product comprising mixing a coloured and/or flavoured substance, either in liquid or powder form, with a liquid  
25 substance to form a liquid mixture, atomising the liquid mixture and rapidly cooling the atomised mixture.

53. A method according to claim 52, wherein the liquid  
substance comprises fat, oil and/or wax.

30

54. A method of making chocolate comprising obtaining cocoa butter or cocoa mass in liquid form, atomising the liquid, rapidly cooling the atomised liquid to form a powder and adding the powder during the chocolate making



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process as part of the crumb making process or at the conching/tempering stage of chocolate production.

5 55. A method of producing a stable free flowing cocoa or chocolate based product comprising obtaining a cocoa or chocolate based liquid, atomising the liquid and rapidly cooling the atomised liquid to form a stable free flowing powder.

10 56. A method according to claim 55, wherein the cocoa or chocolate based liquid comprises fat and/or oil and/or mixtures such as cocoa butter, cocoa mass and various chocolate products.

15 57. A method of taking spray crystallised frozen powder and introducing such powder directly to a freeze drier.

20 58. Apparatus for receiving a substance which is substantially solid at a given temperature, said apparatus comprising means for rapidly cooling said substance to produce a product which is substantially or relatively soft textured at said given temperature.

25 59. An apparatus according to claim 58, wherein said apparatus comprises means for atomising a liquid substance.

30 60. An apparatus according to any claim 58 or 59, wherein the apparatus comprises means for liquifying said solid substance.

61. A product which has been at least partially solidified by spray crystallisation.

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62. A product produced using a method according to any preceding claim.

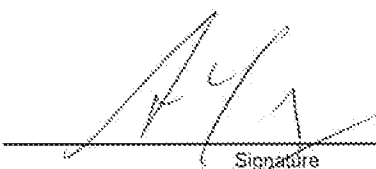
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PRE-APPEAL BRIEF REQUEST FOR REVIEW		Docket Number (Optional) BC-01-US	
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]  on _____  Signature _____  Typed or printed name _____		Application Number  10/521,579	Filed  May 4, 2005
		First Named Inventor  Bertrand et al.	
		Art Unit  1781	Examiner  Chawla, J.
Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.  This request is being filed with a notice of appeal.  The review is requested for the reason(s) stated on the attached sheet(s). Note: No more than five (5) pages may be provided.			
I am the  <input type="checkbox"/> applicant/inventor.  <input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)  <input checked="" type="checkbox"/> attorney or agent of record. Registration number 45,721  <input type="checkbox"/> attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____		 Signature  Arthur Yang Typed or printed name  973-912-5232 Telephone number  20 Dec 2010 Date	
NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.			
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